This key should allow you to understand why you choose the option you did (beyond just getting a question right or wrong). More instructions on how to use this key can be found here.

If you have a suggestion to make the keys better, please fill out the short survey here.

Note: This key is auto-generated and may contain issues and/or errors. The keys are reviewed after each exam to ensure grading is done accurately. If there are issues (like duplicate options), they are noted in the offline gradebook. The keys are a work-in-progress to give students as many resources to improve as possible.

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1. Evaluate the limit below, if possible.

$$\lim_{x \to 8} \frac{\sqrt{7x-7}-7}{4x-32}$$

The solution is None of the above, which is option E.

A. 0.071

You likely memorized how to solve the similar homework problem and used the same formula here.

B. ∞

You likely believed that since the denominator is equal to 0, the limit is infinity.

C. 0.661

You likely tried to use a shortcut to find the limit of a function that only works for when the numerator/denominator are polynomials.

D. 0.018

You likely learned L'Hospital's Rule in a previous course, but misapplied it here.

E. None of the above

* This is the correct option as the limit is 0.125.

General Comment: General comments: It is difficult to imagine the graph of this function, so you need to test values close to $x = 8$.

---

2. Based on the information below, which of the following statements is always true?

As x approaches 7, $f(x)$ approaches ∞.

The solution is $f(x)$ is undefined when x is close to or exactly 7., which is option C.

A. $f(x)$ is close to or exactly ∞ when x is large enough.

B. x is undefined when $f(x)$ is close to or exactly ∞.

C. $f(x)$ is undefined when x is close to or exactly 7.

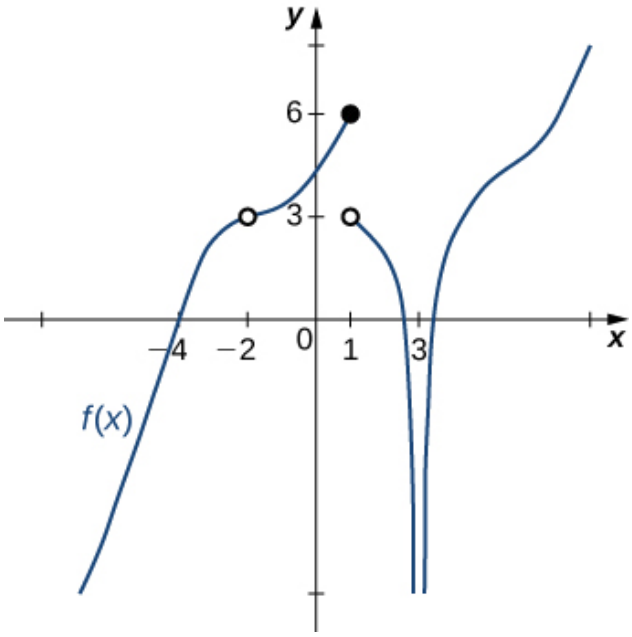
D. $f(x)$ is close to or exactly 7 when x is large enough.

E. None of the above are always true.

General Comment: The limit tells you what happens as the x-values approach 7. It says **absolutely nothing** about what is happening exactly at $f(7)$!

---

3. For the graph below, find the value(s) a that makes the statement true: $\lim_{x \to a} f(x) = -\infty$.



The solution is Multiple a make the statement true., which is option D.

A. $-\infty$

B. -2

C. 3

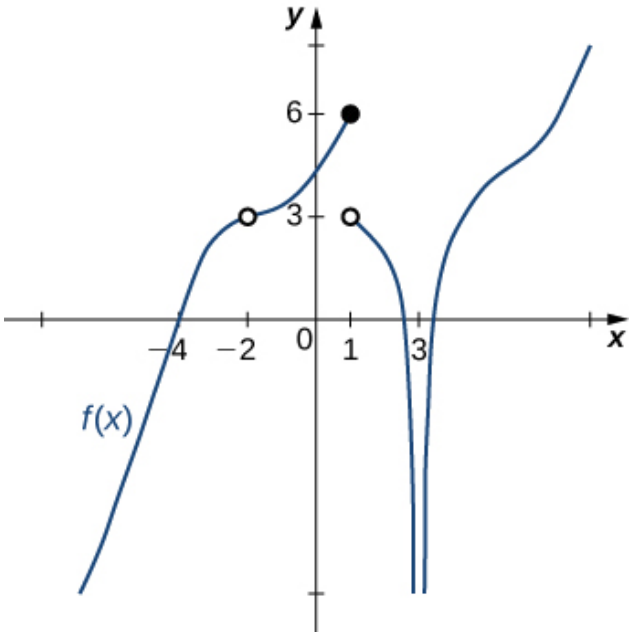
D. Multiple a make the statement true.

E. No a make the statement true.

General Comment: General Comments: There can be multiple a values that make the statement true! For the limit, draw a horizontal line and determine if an x value makes the limit exist.

---

4. For the graph below, find the value(s) a that makes the statement true: $\lim_{x \to a} f(x) = -\infty$.



The solution is Multiple a make the statement true., which is option D.

A. -2

B. $-\infty$

C. 3

D. Multiple a make the statement true.

E. No a make the statement true.

General Comment: General Comments: There can be multiple a values that make the statement true! For the limit, draw a horizontal line and determine if an x value makes the limit exist.

---

5. Evaluate the one-sided limit of the function $f(x)$ below, if possible.

$$\lim_{x \to 8^-} \frac{-5}{(x+8)^8} + 2$$

The solution is $f(8)$, which is option B.

A. ∞

B. $f(8)$

C. $-\infty$

D. The limit does not exist

E. None of the above

General Comment: General comments: You should be able to graph the rational function displayed. If not, go back to Module 7 to learn about the general shape of rational functions.

---

6. Evaluate the one-sided limit of the function $f(x)$ below, if possible.

$$\lim_{x \to 6^+} \frac{1}{(x+6)^4} + 7$$

The solution is $f(6)$, which is option A.

A. $f(6)$

B. $-\infty$

C. ∞

D. The limit does not exist

E. None of the above

General Comment: General comments: You should be able to graph the rational function displayed. If not, go back to Module 7 to learn about the general shape of rational functions.

---

7. To estimate the one-sided limit of the function below as x approaches 1 from the left, which of the following sets of numbers should you use?

$$\frac{\frac{1}{x}-1}{x-1}$$

The solution is $\{0.9000, 0.9900, 0.9990, 0.9999\}$, which is option C.

A. $\{1.0000, 1.1000, 1.0100, 1.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 1 doesn't help us estimate the limit.

B. $\{0.9000, 0.9900, 1.0100, 1.1000\}$

These values would estimate the limit at the point and not a one-sided limit.

C. $\{0.9000, 0.9900, 0.9990, 0.9999\}$

This is correct!

D. $\{1.0000, 0.9000, 0.9900, 0.9990\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 1 doesn't help us estimate the limit.

E. $\{1.1000, 1.0100, 1.0010, 1.0001\}$

These values would estimate the limit of 1 on the right.

General Comment: General Comments: To evaluate a one-sided limit, we want to put numbers close to the limit. We can't use the limit value itself if it results in $\frac{0}{0}$ or $\frac{\infty}{\infty}$

---

8. Based on the information below, which of the following statements is always true?

$$f(x) \textit{ approaches } 17.817 \textit{ as } x \textit{ approaches } 6.$$

The solution is None of the above are always true., which is option E.

A. $f(6)$ is close to or exactly 17

B. $f(17) = 6$

C. $f(6) = 17$

D. $f(17)$ is close to or exactly 6

E. None of the above are always true.

General Comment: The limit tells you what happens as the x-values approach 6. It says **absolutely nothing** about what is happening exactly at $f(6)$!

---

9. To estimate the one-sided limit of the function below as x approaches 5 from the right, which of the following sets of numbers should you use?

$$\frac{\frac{5}{x}-1}{x-5}$$

The solution is $\{5.1000, 5.0100, 5.0010, 5.0001\}$, which is option D.

A. $\{5.0000, 5.1000, 5.0100, 5.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 5 doesn't help us estimate the limit.

B. $\{5.0000, 4.9000, 4.9900, 4.9990\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 5 doesn't help us estimate the limit.

C. $\{4.9000, 4.9900, 5.0100, 5.1000\}$

These values would estimate the limit at the point and not a one-sided limit.

D. $\{5.1000, 5.0100, 5.0010, 5.0001\}$

This is correct!

E. $\{4.9000, 4.9900, 4.9990, 4.9999\}$

These values would estimate the limit of 5 on the left.

General Comment: General Comments: To evaluate a one-sided limit, we want to put numbers close to the limit. We can't use the limit value itself if it results in $\frac{0}{0}$ or $\frac{\infty}{\infty}$

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10. Evaluate the limit below, if possible.

$$\lim_{x\to 3}\frac{\sqrt{7x-5}-4}{6x-18}$$

The solution is None of the above, which is option E.

A. 0.021

You likely learned L'Hospital's Rule in a previous course, but misapplied it here.

B. 0.441

You likely tried to use a shortcut to find the limit of a function that only works for when the numerator/denominator are polynomials.

C. 0.125

You likely memorized how to solve the similar homework problem and used the same formula here.

D. ∞

You likely believed that since the denominator is equal to 0, the limit is infinity.

E. None of the above

* This is the correct option as the limit is 0.146.

General Comment: General comments: It is difficult to imagine the graph of this function, so you need to test values close to $x = 3$.